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GEOGRAPHY AND TRAVELS.[1]

EAST CENTRAL AFRICA.—Mr. James Stewart, of the Livingstonia Mission, in a paper read before the London Geographical Society, gives the following account of the seasons and weather on Lake Nyassa:

"The year can be divided into only two seasons, the rainy and the dry. During the last week of October, when the sun is vertical, a few days of rain may be expected, but this is not the beginning of the rainy season. The rains usually begin about the 1st of December on Lake Nyassa. Further north, and at Pambete on Lake Tanganyika, they begin a month earlier, if my experience in 1879 was a usual one. Perhaps there the October rains really mark the beginning of the wet season. The rains last till April, sometimes even into the month of May. At Livingstonia, on Cape Maclear, the average rainfall is about thirty inches. Lying on a promontory jutting northwards into the lake, it is disadvantageously situated to catch the rain. Frequently heavy showers are seen passing down the east and west shores of the lake while Cape Maclear receives not a drop. At our sub-station at Bandawe, two degrees further north, as much as eighty-six inches of rain have been registered, and that in a season which the natives complained of as being too dry. Between May and October there very seldom is any rain. The soil gets dry and parched; the rank grass withers up and assumes the appearance of golden grain in England in July, only, however, to fall before the fiery storms which sweep across the country in September. This want of cold weather rains is a serious hindrance to agricultural operations. European cereals and vegetables cannot be raised without irrigation. In the dry plains of Northern India, Christmas rains and rains in February may be confidently looked for, and on them depends the success of the great wheat crop of the Punjab. Nothing corresponding to them is found in the Nyassa region of Africa.

"With the change of season a change in the direction of the wind occurs, or more correctly the latter is the cause of the change of weather. Winds from the north prevail from November to May, bringing with them the moisture-laden clouds from the Indian Ocean, while during the whole of the dry weather southerly winds prevail. The constancy of those winds is a source of trouble and expense to us. In May, for instance, it is easy and pleasant sailing to go to the north end of the lake, but to return in the same month requires a constant fight with the elements for ten days or a fortnight, taxing our courage as well as our seamanship.

"It is well known that the barometer in tropical countries is not subject to such rapid changes as in northern latitudes. At Livingstonia the annual range is only about half an inch, or from 28.20

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[1] Edited by ELLIS H. YARNALL, Philadelphia.

inches in November to 28.70 in June. The diurnal variation is rarely more than twenty hundredths of an inch. The barometer is therefore of little use as a weather glass, but, on the other hand, is more serviceable for geographical work in the measurement of mountain heights.

"The temperature on Lake Nyassa is very equable. The average midday temperature of the hottest month, November, is 85° F., and the average night temperature of the coldest month, May, is about 60°—a range of only 25° throughout the year. Occasionally, however, we have days at 95°, and even 100° has been registered once or twice. At the other end of the scale, 54° has been the lowest. As a general rule the wet-bulb thermometer stands at 10° below the dry-bulb throughout the dry months of the year."

As regards the alteration in level of the waters of Lake Nyassa, the observations made at Livingstonia show that "since 1875 the low-water level of the lake has year by year been falling, till in December, 1880, it was three feet below that of December, 1875. Should this decrease continue, the matter will soon become serious during the dry season with regard to the navigation of the southern end of the lake at the entrance to the Shiré, and still more so at the northern extremity of Lake Pamalombé, which, indeed, would probably soon become another marsh similar to Morambala; and the Upper Shiré, hitherto affording such a good waterway, would have its navigation interrupted by snags and sand-banks, while the *Ilala*, already requiring careful steering among the shallows, would be confined to the lake."[1]

As stated in our April number, the waters of the Tanganyika are falling since the opening of the outlet by the Lukuga. Mr. Thomson, of the recent expedition to these lakes, noticed a difference in the two mouths he passed on the shore of Tanganyika and saw a sill beginning to form at the mouth of the Lukuga. In ordinary seasons, Mr. Thomson thinks, "evaporation and rainfall balance each other, but that during some years there might be an excess of evaporation, which was a very likely thing to happen in such a country, and consequently the lake would fall in level. This clearly accounts for the intermittent character of the drainage. There had been a period of very dry seasons, probably before this century, in which the level of the lake was lowered so that no water went out by the Lukuga. Gradually a change took place; the rainfall became more abundant and the water gradually rose until the barrier was swept away and an outlet once more formed for the surplus water of the lake as they now had it."

Mr. Thomson's narrative of his journey has been published under the title "To the Central African Lakes and back," and contains much of scientific interest. He has a note on the recent great improvement in the climate of Zanzibar, the malaria and general unhealthiness experienced there having practically disappeared; since 1857 the rainfall has diminished one-half and the island is now an ordinarily healthy one.

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[1] Livingstonia Mission Report for 1880.

Botanical and conchological collections are treated of separately in an appendix. Mr. Edgar A. Smith, of the British Museum, states that the shells from Tanganyika indicate that "the lake was formerly an inland sea, whose waters have gradually freshened, many of the species having all the appearance of modified marine forms. Nyassa has apparently no connection with the formation of this lake, as it presents a quite distinct conchological fauna."

Of the geology of East Central Africa, Mr. Thomson says, that the coast tertiary deposits "are succeeded near the base of the inner plateau by sandstones and carboniferous rocks striking north and south, never rising over 1000 feet, and suggesting a continental outline unaltered from an anterior period. An immense series of greatly more ancient metamorphic rocks composes the escarpment of the plateau, after which a granitic district (sometimes decomposed and forming thick accumulations of clay) is reached, showing evidences of volcanic eruptions, which extended from the Cape to Abyssinia parallel to and near the coast. The upper plateau is also metamorphic, clay-slates occurring near Nyassa, round which is an extraordinary agglomeration of volcanic rocks, probably resulting from one slowly acting crater. No sufficient material is given for any broad sketch of the country between Nyassa and Tanganyika. The latter lake is set as it were in a socket of sandstone, which ends abruptly with the descent from the plateau, being succeeded by a great mass of felspathic rock forced through the crust of the earth previous to the formation of the present lake, and subsequently fractured into halves. The beds on the eastern side of the lake seem not to have been much disturbed, and were formed by a great inland sea-basin, which included the whole Congo region from Tanganyika to the West Coast mountains, the lake forming a bottom hollow, remaining salt on the upheaval of the continent. This basin disappeared through the channel cut by the great western outlet of the Congo, or by the more speedy fracture of the Zambesi."

The Algerian missionaries in Urundi, near the northern end of Lake Tanganyika, have founded a station on the west coast of the lake at Mulonewa in the Masansi country, on the shores of the large gulf which Stanley named after Capt. Burton. The country is covered with fine trees. A range of hills separates it in the rear from the Wabembe, who are said to be cannibals.

Père Livinhac, the head of the Algerian Missionary Expedition Uganda, has given some account of the rulers of that country. Under the *Kabaka*, or absolute monarch, are the chiefs of the great families, called *Mohamis*, of whom three members visited England in the company of missionaries who returned last year. Below these are a class of inferior chiefs. The lowest order are the *Wadu* or slaves. Mtesa is much under the influence of the *Mohamis*, who are mostly opposed to the admission of foreigners into the kingdom.

We learn from the *Mittheilungen* that Dr. Junker returned from his journey to the Monbuttu country to his station in Ndoruma's territory in December last. He crossed the Welle river half-way between Miani's Bakangoi and the former capital of Munza. Near the latter place he saw the grave of the Italian traveler.. He returned through Wando's land, crossing the Gadde and Bibali rivers at their confluence. He finally departed from Ndoruma's on the 7th of January for Bakangoi and was last heard from at Pulembata in Baria's country on January 28th.

West Central Africa.—Dr. Max Buchner failed in his effort to explore north of the kingdom of the Muata Yanvo. He only reached lat. 7° 22′ S., when the desertion of his porters obliged him to return. He arrived at Malange on February 8th. Most of his collections were on board of a steamer recently lost in the British Channel.

Dr. Pogge, whose visit to the Muata Yanvo six years ago will be remembered, has arrived at St. Paul de Loanda and departed for Dondo.

Herr Flegel, whose trip up the Binué was described in the Naturalist for September, 1880, has recently been visiting the unknown course of the Niger between Jauri and Say. He found navigation obstructed and frequently rendered impossible by beds of immense boulders, through which the stream forces its way with immense difficulty.

On the Congo some advance has been made by the missionary parties in their progress towards the interior. Mr. McCall's party has safely reached Manyanga, near the right bank of the Congo, above the Yellala falls. This mission has now five stations in the first 200 miles on the Congo, viz.: Banana; Mataddi Minkanda, opposite H. M. Stanley's station at Vivi; Paraballa; Banza Montega; and Manyanga, which is situated a few miles inland from the northern bank of the Congo. Another station is to be established at the mouth of the Edwin Arnold river, some miles higher up than Manyanga. Mr. McCall has determined to proceed to Stanley pool by the river, believing that many and perhaps the majority of the intervening falls and rapids can be passed in canoes. He has already passed one, the Ntombo Mataka falls of Mr. Stanley's map.

Meanwhile the members of the Baptist Missionary Expedition, Messrs. Crudgington and Bentley, have succeeded in reaching the pool by following the north bank of the river. After a journey of twenty-one days they arrived at Mfwa, near Mankoneh's village at Stanley pool. From here they crossed the pool to Ntamo or Kintamo, where they remained two days, but finding that the natives did not wish them to stop, they went on by land to Nehasha or Kinshasha, where the natives were even worse, owing probably to a misunderstanding. This appears to be the locality of M. de Brazza's station, and notwithstanding all that the French sergeant in charge said, the natives, finding that Mr. Crudgington and his companions were not Frenchmen, could not be persuaded that they were not enemies. They accordingly made the best of their way back to the opposite side of the river and shortly afterwards commenced their return journey, which was accomplished in fifteen days, partly by land and partly by water.

The expedition now proposes, after consultation with Mr. Stanley, to use his road as far as Isangila, his furthest station, thirty miles above Vivi, and then to place a steel boat on the river above the falls at that point. It is hoped that the navigation will be uninterrupted above Isangila, except at two or three places where the boat will have to be taken round the cataracts. Mr. Stanley himself contemplates adopting this course also, as above Isangila is a very troublesome tribe, named Basundi. He has a steam launch and two steel whale-boats above the falls. He is now awaiting the arrival of a reinforcement of seventy-two natives from Zanzibar.

Mr. Richards, of the Livingstone (Congo) Inland Mission, has recently visited two towns, a short distance from Banza Montiko, where no Europeans had hitherto been. One of them he describes as neat and orderly in its arrangement. He heard of others further on and thinks the population of the district larger than was supposed. The people are intelligent but very shy.

GEOGRAPHICAL NEWS.—The June number of *Petermann's Mittheilungen* contains a valuable paper by Dr. Herman Ziemer, on the greatest daily rainfall. Four inches of rain in twenty-four hours have been recorded at Breslau, Brussels, Geneva, Trieste, Milan and Genoa. Verviers heads the list of European towns with fourteen inches. Purneah, Bengal, has had thirty-five inches. In the British Isles the greatest registered is 12.5 inches at Portree, in the Isle of Skye.——The Royal Geographical Society have published a General Index to the fourth set of ten volumes of the Society's *Journal.* Also a classified catalogue of the collection of maps. A second supplement to the catalogue of the library will include additions to the end of 1880.——The engineers engaged on the Panama canal find great difficulty in deciding how to treat the Chagres river. An immense dam is proposed to turn the river into a lake with an outlet to the Pacific, but the task would be a gigantic one. The dam would have to be a mile long, over 1000 yards thick at the bottom, 250 at the top, and some 50 yards in height.——A narrative of the journey of Count Bela Szechenyi through India, Japan, China, Tibet and Burmah, by his companion, Lieut. G. Kreitner, is to appear in thirty parts, illustrated with wood-cuts, maps, etc., and published in Vienna.——Capt. J. E. Sandeman, of the British Indian Survey, has recently sent out a trained native explorer to endeavor to ascertain the source of the Irrawaddy river. He went up the stream in boats to Kacho, lat. 25° 20′, at an elevation of about 1000 feet above the sea. Thence by land he continued on to Mogungpoon Maingkung, lat. 26° 8′, at which place the exploration terminated. The eastern and western branches meet at Ponk-san-poon; the western branch is the largest and is said to rise in the Kanti country. There seems to be no doubt that there is no longer any reason to suppose the Irrawaddy is connected with the Sanpu river of Tibet.——The *Academy* says there are several expeditions preparing to visit the Obi and Yenisei gulfs this season. M. Siberiakoff is fitting out sledges to take supplies to two of his vessels which have been frozen up in the Gulf of Obi during the winter. The steamer *Nordenskiöld* will sail for the mouth of the Yenisei from Gothenberg. A hydrographic expedition is also being formed in Russia to visit the Sea of Kara and Gulf of Obi.

MICROSCOPY.[1]

THE BLOOD IN HIBERNATION.—In the autumn of 1879, Professor V. Wittich, received twelve living German moles (*Mus montanus*), in order to investigate the amount of glycogen in the liver during their winter sleep. One animal was killed accidentally immediately after its arrival, and the results obtained on a microscopical examination of the blood, led to an examination of the blood of the other animals, all killed in perfect health, and in all the same appearances were found. One of the animals had died on the journey without signs of disease, although perhaps in consequence of a bite from another animal.

The blood taken from a vein in the peritoneal cavity contained a large number of thread-like moving objects, which moved the blood corpuscles lying near them, and, after diluting the blood with a-half per cent. solution of chloride of sodium, presented an appearance identical with that of the spermatozoa of the frog. These organisms appear to be the same as those described by T. R. Lewis as existing in the blood of healthy rats. They are much larger than the spirilla met with in the blood of relapsing fever. They were found in the blood from various parts, arterial and venous, in every animal. They disappear from the blood as soon as decomposition sets in and the putrefaction-bacteria appear. They were very numerous, ten or twelve being found in every drop of blood, and they furnish a new proof of how large a number of parasitic organisms may exist in the blood without causing any disturbance to the general health. Attempts were made to inoculate guinea-pigs, but in every instance with a negative result.—*London Lancet.*

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[1] This department is edited by Dr. R. H. Ward, Troy, N. Y.